THE

VETERINARY JOURNAL

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AUGUST, 1919.

Editorials.

THE COST OF LIVING AND THE QUESTION OF SALARIES.

THE cost of living and the question of salaries is affecting the members of our profession as seriously as those of any other, and the letter on the pay of the Indian Civil Veterinary Department which appears in our correspondence column should be read by everybody, as its author is one who knows the circumstances thoroughly.

It is not, however, only in the Indian Civil Veterinary Department that this question should be taken up, but at home, in the British Isles, in respect to the pay of the junior veterinary officials of the Government in England and Ireland, and in regard to those of certain of our Corporations ; the expenses of living have trebled themselves and the salaries still remain almost the same as at first.

With the private practitioner it is serious enough, but he, at all events, has some latitude in that he can use his own discretion about the fees he charges, but with the official whose salary is already fixed the times press hard.

Workmen's Unions and manual labour are having their day just now, and the professional man is feeling the pinch almost to the extent of being starved out. Government salaries must rise in proportion to the expenses incurred, if efficient officials are to be obtained, and to attain this the law of supply and demand must be brought snto play. Our junior members—especially those newly fledged—ihould weigh well the *pros* and *cons*, and take the advice of their

older and more experienced friends before running their heads into any nooses from which they will find it difficult later on to extricate themselves. When once one has got into a red-tape groove and lost touch with the methods of general practice, it is hard to take up one's individuality and again assume responsibility. Frankly, considering the education attained and the money to be spent before qualifying as a veterinary surgeon, a permanent £300 a year billet, without reasonably rapid prospect of progressive increase, is a poor monetary return for the amount of labour and skill which has been spent. No Government or Municipal veterinary position should commence at less than this, and, in order to keep the best men, the salary should be progressive to a fixed and stated sum of sufficient amount to enable a man to properly educate a family and maintain a status becoming that of a member of a clever and learned profession.

THE MINISTRY OF HEALTH BILL.

THE draft of the new Ministry of Health Bill has no allusion whatever to veterinary inspection, although it deals with meat and milk questions, and must of necessity embrace diseases communicable from animals to man.

According to Clause 2 it is stated that " It shall be the duty of the Minister to take all such steps as may be desirable to secure the effective carrying out and co-ordination of measures conducive to the health of the people, including measures for the prevention and cure of diseases," etc., etc.

This must include measures against tuberculosis, anthrax, glanders, and all other diseases which man can take from animals and to omit the inclusion of a veterinary surgeon from the Board is a grave error, as no one but a member of our profession is truly competent to give advice on these matters.

The North of Ireland Veterinary Medical Association, in a deputation sent to the Chief Secretary for Ireland, obtained a promise that a veterinary surgeon should be one of the " six other persons having practical experience of matters relating or incidental to or affecting the health of the people." This is well as far as it goes, but a veterinary surgeon should be included in the same clause as that which ordains the appointment of a Specialist in Medical Sanitary Science.

A further Bill is promised for a later date and propaganda work should be seriously taken up by the whole profession to ensure that direct representation shall be obtained for our profession.

Original Communications.

PSAMMOMA OF THE HORSE.

By Capt. J. R. HODGKISS, D.S.O., F.R.C.V.S.,
Royal Army Veterinary Corps.

According to Dexler quoted by Hutya and Marek, this brain tumour of the horse is very common, he finding them in 22.5 per cent. of 204 horses examined. In the work of Hutya and Marek, these tumours are called *Cholesteatoma*, but as the translation in the English edition and Sir John M'Fadyean in the "Journal of Comp. Path. and Therapeutics," p. 137, Vol. XXIV, point out, this term should be reserved for the tumour described and most excellently pictured in that journal to which I refer readers for comparison with the condition here shown. It is with the object of contrasting these two tumours pictorially that I hope to get the accompanying photograph reproduced. Although psammomata occur frequently, those causing brain disturbance would seem not to be very common.

In the report of the Army Veterinary Service for 1912, Table XV, only one case of brain tumour is shown as having occurred during that year among animals in the Service in the United Kingdom, though, of course, it is not impossible that some animals were cast and destroyed for obscure nervous disease under some other heading, which on post-mortem were found to have been suffering from brain tumour.

For myself I have only seen two cases in a decade among considerable bodies of horses. In neither case were the symptoms such as would be diagnosed as acute mania and which are typical of this condition.

Case. I.

This was an animal of the Royal Engineers with no previous history of brain disturbance. It was found lying stretched out in the troop stable perfectly unconscious with stertorous breathing and markedly amaurotic. It died in twelve hours without recovering from the coma.

Post-mortem psammomata were found in both ventricles.

Case II.

Forms the subject of the accompanying photograph.

The animal from which the brain was taken came under my personal observation in February 1914. Her history previous to that is a little obscure, but there appears to be no doubt that she first exhibited brain symptoms on Irish manœuvres September, 1913. On this occasion she nearly strangled herself by suddenly running back and falling over when on the picket line. This may have been a

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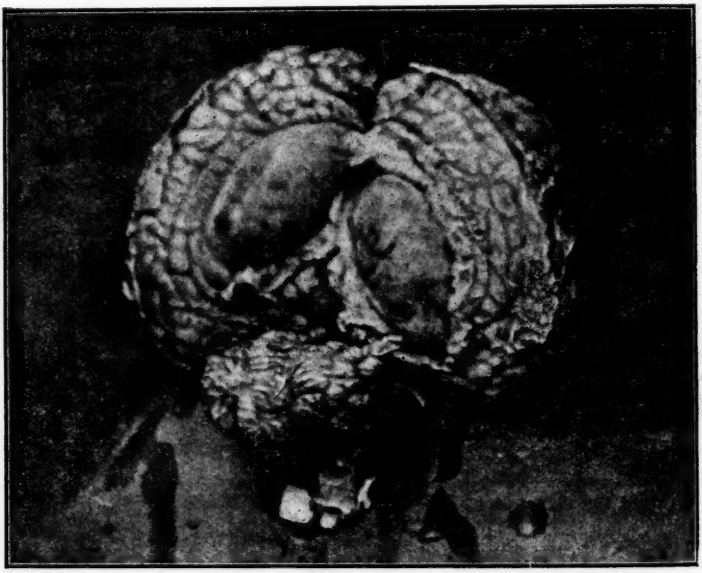
coincidence, but in the light of subsequent events I think not. In February, 1914, the mare came up for treatment for a kick on the elbow. Her walk was hesitating with exaggerated action.

When she was being led she would suddenly " rein back " without any apparent reason and then obstinately refuse to go forward. In the stable she fed slowly, sometimes stopping in the act of chewing. She would permit her fore legs to be placed in unusual positions, without attempting to replace them.

Frequently she ran back in the stall, necessitating the wearing of a neck-strap to prevent injury.

Her pulse was slow and regular, the pupil of the eye slightly dilated.

During the whole time she was never observed pushing her head into a corner or attempting to climb the wall.



During the two months previous to her destruction she lost condition, had no bloom on her coat, and was very dejected.

As the mare was useless for work she was cast and destroyed in June, 1914.

The result of the post-mortem was as shown in the photograph, the finding of two large psammomata.

NOTES ON VETERINARY PRACTICE IN THE WEST INDIES AND THE MALAY STATES.

By T. A. FORD, F.R.C.V.S.,
Selangor.

I HAVE been asked to write an article for THE VETERINARY JOURNAL on the life and practice of a Veterinary Surgeon in the tropics, and contrasting the West Indies, where I first was, with the Far East, where I am now employed.

The climate of Antigua, the seat of the Leeward Islands Government, is hot and dry, with some attempt at seasons, being much cooler and generally very pleasant during the months of December, January and February. The hurricane season—August, September and October—is very hot and oppressive; the steady, strong North-east trade winds drop during these months, and the winds are generally light and variable, though if a hurricane does come it makes things lively, and possibly blows the house down and buries you under the ruins. The last and only hurricane I experienced on land was in August, 1899, and, although not regarded as a severe one, did a great deal of damage to the sugar cane crops and various buildings about the country. Earthquakes are very common, and I have felt as many as six during one night; they are as a rule not very severe. Living and house rent are both cheap. A horse could be kept fairly well before the war for about 10s. per week, including grooms' wages. The only food used for horses and mules is Indian corn, imported from America, and Guinea corn, a kind of millet, grown in the Island, cane tops and Guinea grass. The cattle and mules kept on estates have, besides, a chaff made up of cane tops and molasses; bedding is composed of dried cane tops called trash.

About the only serious disease, or at least the only one that caused any great loss, I ever met with is what is called locally "skin disease" in cattle; it occurs in cattle of all ages, is a form of eczema, and due to a combined attack of internal and external parasites. I studied the disease pretty thoroughly when I was out there, and concluded that the cause was undoubtedly due to the cattle being compelled to drink from ponds, which in all cases received the drainage from either the pastures, cane fields, which were periodically manured, or the cattle pens themselves, and in most cases from all stud sources. There were only one or two estates where well water could be obtained, and on these cattle did not, or only seldom, become affected. The Island was subject to long droughts and there was no other water supply but the ponds available for cattle to drink from.

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I never performed a post-mortem examination on a beast without finding strongylus bontootus in varying quantities in the fourth stomach, usually very numerous, and in nine cases out of ten accompanied by strongylu micrurus in the bronchi. I have no doubt, and it is, I think, very evident, that as all the cattle are infected with these entozoa, they go on infecting each other, through the fæces, etc., which, though dropped in the cattle pens, pastures, etc., are bound to reach the ponds sooner or later. The manure used for the cane fields is made by placing trash in the cattle pens, and is spread when fit.

The numerous ticks always found infecting cattle in Antigua are of two kinds: the small Ixodes, and a very large variety, as large as the top of one's thumb, known locally as the St. Kitt, or gold ticks which, attaching themselves to the beasts, speedily bring about a condition of the skin, particularly around the udder, scrotum, and between the forelegs, which when once seen is not easily forgotten, as some time after the animal begins to show signs of disease these parts become a series of ulcerated patches varying in size from a shilling a piece to three or four inches square; and one can easily understand how an animal, which has been attacked with the strongyles in the early part of the year, run down from the irritation and interference with proper nutrition caused by them; would speedily become a mass of skin sores when the external parasites begin their attack on the unfortunate cattle about May and June. Another thing that is, I think, significant, is that this skin disease is usually more severe after a wet year, showing that more parasites in either the ova or some other stage are present either in the drinking water or on the pastures.

There is a disease affecting mules and donkeys, seldom horses, though they are occasionally affected, called locally "erysipelas." I could never quite make out what the pathology of this infection is, but, from the description, I think it not unlike epizootic lymphangitis. It is undoubtedly contagious, as new mules never get it (none were bred in the Island in my time) until they have been working on an infected estate for some time, certainly over a year. The disease is seen worst in old animals, but those in good condition are attacked; it recurs intermittently, never kills, and may last for years. I have seen mules over 20 years old suffering. The parts usually attacked are round about the knee and hock joints, and occasionally the sheath. The disease commences with a slight œdema of the whole limb, a small swelling at one part where the skin is tense and shiny, and the hair falls off, to be succeeded by the bursting of this small elevation, leaving a pit-like, ragged-edged ulcer, perhaps ¼ inch deep, which discharges a

dirty grey sanious fluid. After some few days fungoid granulations spring up, and a growth of moderately firm material appears, which may either increase to a large size (I once removed from the fetlock of one mule affected with this disease a growth weighing 2½ lb. from the inner side and 9 oz. from the outer) or gradually contract, leaving a larger or smaller irregular shaped scar. These growths are very vascular and easily bleed; the blood vessels are small and, being very friable, difficult to ligature.

I found it best to keep the animals at light work unless they were very lame. Cleanliness, antiseptics, with the cautious use of caustics, was the treatment I adopted with uniformly good results, for the time being.

Tetanus is a comparatively common disease in Antigua, and frequently follows injuries and operations, though the so-called idiopathic form is by no means uncommon; the death rate is very high. All my cases were amongst horses and mules, except one, a fox terrier, which recovered. I tried the anti-tetanic serum in a few cases, but did not get good results.

Diseases of the bowels, colic very common, voloulus and intussusception rare. These diseases are probably due to feeding the mules and horses almost exclusively on maize.

Laminitis in ponies is very common and invariably due to a combination of bad shoeing, by cutting and rasping away all the foot wall, and reckless galloping on the hard flint roads. Cases of navicular disease are rare, but contracted tendons and standing over at the knees were very common indeed; bone diseases rare, splints not exactly common, ringbone rare, and spavins very seldom seen.

I only saw one outbreak of glanders in Antigua. The first case was found in a mule just imported from New York; the disease caused the deaths and destruction of about 30 mules and ponies, but was successfully confined to the one estate which imported the infected animal.

Outbreaks of distemper were occasionally seen, but the disease was generally of a mild catarrhal type. Very few dogs were imported. Of swine fever I had only one outbreak, the source of which was not distinctly traceable, but some swine had been imported for stud purposes, and to improve the local breed, in the earlier part of the year from England. The outbreak lasted some four or five months, and pigs died in hundreds all over the Island. So far as I am aware the disease has never reappeared.

Castration of ponies and cattle, parturition cases, nearly all confined to cattle, and all kinds of wounds and injuries complete the

practice in Antigua. In connection with the latter it is worthy of remark that flies are very numerous all over the Island, but to see maggots in wounds on animals was very rare indeed, while in the East, where flies are very seldom seen in either houses or stables, I think I may say I never saw a wound, no matter how small, which was not swarming with maggots, unless it was speedily attended to and kept constantly dressed with powdered iodoform, which is the only drug I have found of the slightest use for the purpose.

In the Far East, just about 3° North latitude, and about 200 miles from Singapore, are the Federated Malay States, consisting of Perak, Pahang, Negri, Sembilan and Selangor. In the latter I hold the post of Government Veterinary Surgeon. The climate is hot and damp; temperature varying from a minimum of about 70° F. to a maximum of 85° all the year round in the shade. The chief industries are tin mining, rubber and coffee planting, though some sugar is grown in Perak. The roads are as a rule excellent all over the States, and a lot of travelling is done by motor car and bicycle; there is also a very good railway service, connecting the chief towns in all the States, except Pahang, which, however, is well served by a motor car running daily from a town called Kuala Kubu in Selangor to Raub in Pahang. As there are at present no railways in this State, communication is afforded by a motor car service to Kuala Lipis and Bentong from Raub daily for passengers. All heavy goods are carried by bullock cart, which forms the chief means of transport for all kinds of goods in the Malay States. In some parts, especially where much padi is grown, the country is very swampy, and the only means of getting about is on foot.

The population of the Federated Malay States is largely Chinese, who are engaged in tin mining, but besides these there are Sikhs, Pathans and Tamils from India, who form the greater part of the cattle owners and drivers. The Malays, besides owning cattle for cart work, practically own all the buffaloes, which are used principally for hauling logs out of the jungle, and in trampling the padi fields before the young plants are planted out. Social life in the East is much in advance of that in the West, and all over the States there are clubs for almost all kinds of sports—polo, turf, tennis, football, cricket, rifle shooting, etc. These States swarm with game of all kinds, from snipe and pigeon to panther, tiger, rhinoceros, elephant and sladang (a huge, great wild beast of the bovine tribe). Snakes abound and some very venomous varieties are common; but it is a remarkable thing that, although one knows, when walking along jungle paths, any of these animals are never far off, it is very seldom one ever sees any of the big game.

Compared with England and the West Indies living expenses are much higher, and house rent very high. Servants, again, are expensive, though usually fairly good, but one must, as in India, keep a small regiment of them, with this difference, that they get about treble the wages they would obtain in India or China.

A horse cost before the war about $30 (£3 10s.) a month to keep; this includes the syce's wages of about $12 to 13, and each horse must have its own syce. The principal fodder consists of a mixture of crushed oats, peas and bran, called "crushed food," which is made in Calcutta, and imported in bags; Australian oats, bran, hay, etc., can be obtained, and the syce cuts grass and bedding as required. Padi (rice in the husk) is used exclusively by the natives for their horses and ponies, and mixed with the crushed food in equal proportions for the European-owned Australian horses. The grasses found in the East contain little else but vegetable fibre and water, and the Guinea grass, about the very best of all tropical grasses, is not by any means so nutritious as that growing wild in the West Indies. In the East we have to plant it, and keep the plots clean, or it is speedily killed out by other coarser kinds of grass.

In the West Indies a few horses from America, Prince Edward's Island, and Canada were imported, but by far the larger number of animals were bred locally, and a useful, hardy lot they were, especially the Barbuda ponies. In the East, however, so far as the Federated Malay States are concerned, all the horses are imported from Australia, usually as griffins through the various turf clubs for a race meeting. After the griffin races are over, they are broken to harness and frequently race again as roadsters. The ponies, which are used almost entirely for gharries, come from Sumatra and Java, and occasionally from China, while cattle and buffaloes, sheep and goats arrive from India, Siam, the Dutch East Indies, and a few from Australia. Pigs, although bred in large numbers in Selangor, are also imported to the extent of about 20,000 a year from Malacca, where pig breeding forms a large industry among the Chinese; they are fed on the refuse from the tapioca plantations.

At Port Sweltenham, 27 miles from Kuala Lumpur, the chief town in Selangor and the capital of the Federated Malay States, there is a commodious and well-equipped quarantine station for animals, under the control of the veterinary surgeon, with a native inspector in charge, who examines all animals imported, and, if healthy, allows them to proceed inland, or quarantines them in the station, if found or suspected to be diseased. Some 25,000 animals annually are thus dealt with at the only port where animals can be landed in Selangor.

The country is well watered, and the rainfall averages 70 to 80 ins. per annum. Besides the water from streams, wells can be dug and good water obtained nearly all over the States; in fact, in many places a good deal of difficulty is experienced in burying carcases owing to the amount of water met with three or four feet from the surface.

Away from the towns and mining centres the whole country is covered with dense jungle, very difficult to walk through, owing to the creepers, most of which are spiny, and tangled undergrowth of all sorts, and one frequently meets with numbers of those most troublesome of pests, the jungle leeches, called "Patchet" by the Malays. This species of leech, together with a much larger one, called the buffalo leech or Lintah, measuring when full of blood four or five inches long, are found in the swampy jungle and about the padi plantations or "sawars." They attach themselves to one, without giving rise to any feeling of discomfort, until after they have dropped off, when a nasty little wound is left, which often bleeds for quite a long time.

As Government veterinary surgeon, my work consists principally in dealing with outbreaks of contagious diseases amongst animals, and sanitary work as regards cattle pens, stables, etc., with the supervision of the animals killed for food, and the slaughter-houses, all of which are under the immediate control of native inspectors appointed by the various sanitary boards, and who appeal to me in any case of doubt they may have where diseased, or animals which they consider unfit for slaughter for food, are brought before them by the butchers.

A good deal of time is taken up travelling about the country inspecting cattle pens, etc. When on this duty, it is found impossible to return home; one stops the night at the most convenient Government Rest House. These are well built, furnished houses, kept up by Government, for the use of officers' travelling on duty, and *bona fide* travellers; each house is in charge of a caretaker, and one or two other servants are kept as well. The catering is mostly fair to middling, though in some the food and accommodation are excellent. When dealing with outbreaks of disease one, of course, lives for the time being in the nearest Rest House, and does all one's work from there until the trouble is over.

The principal contagious diseases I have to deal with are rinderpest and foot and mouth disease. With regard to the former I have practised the serum alone method of preventive inoculation, certainly with satisfactory results. The serum is obtained from the Govern-

nent bacteriologist of India, and manufactured at Muktisar. I have found the susceptibility of the various breeds of cattle in the Federated Malay States vary considerably, and use in the case of the Indian breeds twice and in the cattle imported from Kedah and Siam and half-breeds four times the dose recommended by the Indian Imperial bacteriologist for Indian plains cattle. So far my results have been: About 16 per cent. of inoculated animals developed the disease with a death rate of 10.49 per cent., or, to put it in another way, 16.21 per cent. developed disease after inoculation, and 64.72 per cent. of these died out of nearly 1,700 inoculations during 1904.

The great drawback to the use of serum in my experience is the short time it confers immunity from the disease, usually not more than a month or six weeks, and I do not think it modifies the disease when an animal is attacked some few days after inoculation.

The serum, combined with strict quarantine, I have found has enabled me to stamp out the disease, where I have been able to isolate the centre, in a month or six weeks, and at the end of that time to open the roads for traffic. I do not believe the virus of rinderpest remains active so long as is usually stated, as I find that pastures are safe for grazing after being closed for about three weeks or a month; this is certainly so in Selangor, and is probably due to the effects of tropical sunlight. Cattle pens where intected animals have been kept should be thoroughly disinfected, so far as brick and cement work is concerned, and all woodwork with which discharges from the cattle may come in contact should be burnt.

With regard to foot and mouth disease, all I do in an outbreak of this disease is to keep the affected animals confined in their pens together, and treat antiseptically. I have little trouble in dealing with this disease in this way, and as a rule very little spread. The death rate is very low—certainly under 1 per cent.—and death only occurs amongst old and neglected animals.

Surra. This disease has only just appeared in Selangor. I found one case (so far as I know the first ever reported in the Straits) in a pony during 1903. The disease did not spread, and this remained an isolated case till 1905, when the disease was found in Perak, where it caused the deaths of several ponies and cattle.

Swine fever I have only seen once; it did not differ from the disease as seen in England.

Rabies. I have had to deal with five or six outbreaks of this disease, which occurs from time to time. I have never yet been able to trace an outbreak to its source. The furious form is usually met with. I have only seen one case of dumb rabies. The means taken to stamp out the disease is tying up or muzzling all dogs, and shooting

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stray animals in an infected area, during a period of a couple of months.

Distemper. This disease is fairly common and usually appears as the fatal intestinal form. All breeds of dogs in Selangor seem to be about equally susceptible, from well-bred English and Australian to the ubiquitous pariah, owned by a coolie, and living as best he can as a scavenger.

Osteoporosis. I have met with several cases of this disease, and always in Australian horses. Apparently it assumes an acute form in the horse and a chronic form in ponies.

Kumri. This disease is not uncommon, and in one case which I was able to trace right through, sections of the spinal cord showed progressive schlerosis of the superior lumbar fibres as high up as the medulla. From the time of this horse's arrival from Singapore till he was destroyed, the animal gradually lost all control of co-ordinated movements of both hind limbs, until at last he could only walk a few hundred yards without falling.

Glanders. I have had a few sporadic cases of this disease in Selangor. There was one case I had, and which I have referred to when dealing with the filaria found in the blood stream which clinically resembled glanders and farcy. An Australian racehorse, which had been in the country for some 18 months, gradually began to lose condition; a chronic irregular fever set in, accompanied later by subcutaneous swellings, at first in the hind limbs, but later in the forelegs, abdomen, and neck; these swellings varied in size, but were never very large. On being opened, or allowed to burst, they discharged a glairy yellow fluid, or thick pus; some of these healed fairly rapidly, others ulcerated. There was never any ulceration of the echniderian membrane to be seen, but a thick yellow blood-stained discharge was intermittent from both nostrils. The animal was destroyed and a post-mortem examination revealed all the internal organs apparently healthy. The vomer was covered to a great extent on both sides by areas of coarse granulation tissue raised above the surrounding mucous membranes. A narrow zone of intense congestion surrounded the smaller areas so affected. Sections of the subcutaneous tissues and of the growths on the vomer showed masses of round culed growths; the surrounding connective tissue was little thickened. No organisms were found in the deeper parts of the growths. No growths of the organism of glanders were obtained, and injections made into animals susceptible to glanders all failed. No other cases occurred in the stables which this horse came from, although there were several contacts.

Anthrax. I have only seen one case of this disease, which occurred in a pony in a racing stable. I attributed the cause to contamination of one of the foods in use, but could not be certain which. Anthrax is certainly rare in Selangor, as I have never seen it in cattle.

Worm in the eye is not uncommon and after puncture of the cornea and release of the parasite, the horse sees as well as ever ; all that usually remains is a small white cicatrix where the puncture was made. Worms between the lids and eyeball of cattle are very common ; they are small white worms about 1 to 1½ inches long, cause a small amount of irritation and increased lachrymal secretion, which flows down over the animal's face, and can be removed by carefully syringing the eye with boracic lotion. Worms of a similar kind, but smaller, are found in the same position in the fowl.

Laminitis and navicular disease are occasionally seen, but are not very common. The former is usually found in native gharry ponies, and is in every case due to cutting away the toe of the foot, putting on the shoe too far back, and rasping away the horn to fit the shoe.

Bovine Malaria (Texas fever). A few acute cases of this disease have been met with in recently imported Australian cattle. The parasite may be found in almost all the native cattle, Indian and Siam, usually in the small round form, though in the Australians it is found in the pear-shaped form and frequently double (Pirosoma Bigeminum). It is the presence of this parasite which frequently causes death amongst cattle which are recovering from rinderpest, as in several cases the animals' bloods was found to be infected with Pirosoma while they were suffering from rinderpest.

The Filaria Immitis is not uncommonly met with in dogs which die suddenly, or succumb after a few hours' obscure illness. I have never yet been able to find the embryos in the circulating blood, but I have seen them in slides made directly from the blood in the right ventricle.

Parasites, both external and internal, are very numerous on all the animals I have had to deal with in the East. I have found some embryonic filarial forms in the blood of both cattle and the horse, but so far, except in one case, I could not refer them to any adult form. This exception was in an Indian ox, which was suffering from Surra. Several small embryonic forms were found in each slide of blood. After this ox was destroyed several adult worms were found in the posterior aorta. These are described by Dr. Lingard, Imperial Bacteriologist to the Indian Government, in a recently published monograph.

In the case of the horse, which was suffering from a disease, resembling glanders, the embryos were only found once, although looked for several times subsequently. A thorough search was made after the animal was destroyed, but no parasites of any kind were discovered. The parasites which cause most annoyance are the larvæ of various flies, which invade newly made wounds, sometimes in hundreds and burrow in all directions.

Tuberculosis. I have only seen one case of this disease which occurred in a sheep kept within the gaol at Kuala Lumpur. This sheep was one of a series of animal experiments carried out by the medical authorities when they were investigating the causation and methods of spread of beri-beri. The disease is, however, not uncommon amongst monkeys kept in confinement.

I have never seen a case of tetanus in the East.

At Kuala Lumpur there is a well found Government laboratory affiliated with the London School of Tropical Medicine. This building—The Institute for Medical Research—is used for the investigation of tropical diseases, both human and animal; it is under the control of a director with European and native assistants, and a considerable amount of research work has been done, particularly in malaria and beri-beri. A bacteriologist is attached to the institution and undertakes the investigation of all cases of contagious disease. Pathological specimens sent to the director are preserved and prepared for microscopical examination.

I need hardly say what a boon such an institution as this is, as so many cases occur, which one must be certain about before taking definite action.

The grounds attached to the institute are extensive, and there is a space double fenced, which is entirely reserved for veterinary cases where animals suspected to be suffering from a contagious disease may be promptly and effectively isolated, and as a number of small animals, rats, guinea-pigs, rabbits, monkeys, etc., are kept, inoculations with blood or discharges from a diseased animal can be performed, watched, and a definite diagnosis made under the most favourable conditions. Such a course is always adopted with suspected cases of rabies. Dogs are received which have been destroyed as mad, and mutilated to such an extent as to make a reliable diagnosis impossible without the inoculation experiments on rabbits conducted at the institute.

Another great advantage is that with the permission of the director the institute is open for anyone to work in, and several investigators have availed themselves of this privilege.

SOME CASES OF BUTTERCUP POISONING IN CATTLE.

By W. S. MULVEY, F.R.C.V.S.
Chelmsford.

I was instructed to investigate a suspected case of anthrax, and on arrival at Ingatestone I found two nine months' old heifers dead. Microscopical examination decided that it was not anthrax.

Post-mortem examination revealed intense inflammation of stomach and intestine.

I saw two other animals of the same class three days after.

They were off feed and appeared very depressed, and quite blind in both eyes from amaurosis.

One of these died. The post-mortem result was exactly like that of the other two. The brain and stomach were analysed. Report attached.

The next case I saw throughout.

The cow was found in the meadow in great pain about 10 a.m. and was immediately removed to a loose box. I saw her about 12 noon. She continued to show signs of abdominal pain until 11 p.m., when she died.

For the last three hours she could not stand; there was complete amaurosis.

Immediately after death the carcase became enormously distended.

The post-mortem result was exactly like the other three.

The analysis is attached.

I have not come across any reports of this poisoning before, but I find that the French have reported several deaths from eating the flowers of this plant.

Herewith is the analytical report of Mr. McKenzie Taylor, B.Sc., analyst to the East Anglian Institute of Agriculture.

Poisoning at Ingatestone.

Occurred May 15, 1919.

Number of cattle affected—four.

It was only possible to examine the brains and blood of a heifer which died some time after being poisoned.

A trace of aconitine was found in the brain, but no alkaloid could be detected in the blood.

No cake was being fed, and having eliminated possible poisons, examined pasture. The pasture was very poor and the ground sloped towards a pond. On this slope a large quantity of ranunculus acris was growing. A considerable quantity of this had been eaten. No other plants likely to be poisonous were discovered in the pasture.

Poisoning at Brittons Hall Farm.

One cow died on May 24, and an examination of the brain and stomach was made.

No cake was being fed; the pasture was exceptionally poor and a considerable quantity of ranunculus acris was present. This was examined and a large amount had been eaten.

Examination of Stomach.

The stomach contents were digested for 72 hours in the cold with alcohol. The resulting mixture was filtered through muslin and evaporated to dryness. The residue was exhausted with absolute alcohol and filtered, the filtrate being evaporated to dryness. The residue after this evaporation was extracted with water and filtered. The water extract was shaken with ether several times to extract fat, etc., and then made alkaline with sodium carbonate. The alkaline liquid was extracted several times with a mixture of chloroform and ether.

The chloroform and ether extracts were mixed together and evaporated to dryness, the residue being weighed. After weighing, the phosphomolydic acid test was applied, a lemon-yellow precipitate being formed, indicating the presence of aconitine. The residue was also tested and produced the characteristic numbing sensation of aconitine.

Examination of Brain.

The method of extraction above described was applied to the brain, the alcohol used for digesting the brain being acidulated with tartaric acid.

Examination of Ranunculus Acris.

A quantity of ranunculus acris was passed through a mincing machine and weighed. The minced ranunculus was then digested with acidulated alcohol, as described, and tests applied to the alkaloid extracted. The results of these tests corresponded in every way with those obtained by testing the extract of the stomach and brain.

Amounts of Alkaloid Extracted.

	Blood.	Brain.	Stomach.
Ingatestone.	Nil.	Trace.	Not examined.
Britton's Hall.	Not examined.	.31 grains.	3.70 grains.

An estimation of the amount of alkaloid extracted from ranunculus acris was made and .64 grains were obtained from 100 grains of the buttercup.

Botanical Descriptions of the Plant.

These specimens are of the species *Ranunculus Acris*, meadow ranunculus or meadow crowfoot. The height is about three feet when growing on good ground, "but in poor or mountain stations sometimes not six inches."—Bentham and Hooker.

Anne Pratt, in "Flowering Plants of Great Britain," remarks: "This species, which blooms from April to September, is, as its name imparts, very acrid. Cattle only eat it when hungry; and Curtis says that if eaten by them in any quantity it will blister their mouths. He adds that he blistered his own hand by gathering it."

2. *Acris* is one of the three common field buttercups, but the lack of runners easily distinguishes it from creeping crowfoot (*R. repens*), and the non-bulbous root from the bulbous crowfoot (*R. bulbosus*), which is very common in some meadows.

RANUNCULUS ACRIS—VAR BORŒANUS.

Plant 2–3 ft. high, erect, without runners.

Rootstock erect, roots fibrous.

Stem glabrous below.

Leaves finely cut, lower leaves all petioled, upper leaves sessile; all covered with very fine, short hairs.

Peduncles not furrowed.

Flowers about 1 inch in diameter, calyx spread.

Achenes compressed, glabrous, style hooked.

Flowers (June and July) perennial. Found in meadows, etc., all over the British Isles.

Indigenous in Europe, Northern Asia. Introduced in America.

TRAUMATIC PERICARDITIS WITH EFFUSION DUE TO SWALLOWING OF ONE NAIL.

By S. K. GUPTA, G.B.V.C.,
Professor of Veterinary Science, Allahabad Agricultural Institute, Allahabad (India)

SOME time ago two she-buffaloes and one cow of the Ewing Christian College Dairy, Allahabad, died suddenly. The animals were quite all right in the evening and were found dead in the morning. I suspected the disease to be a virulent infective disease such as anthrax, as I noticed clots of blood escape by the nose and anus of the dead bodies. I performed the post-mortem operation of one buffalo. The rumen was punctured at several places, which I thought might have been caused by the knife at the time of bringing the stomach out of the abdominal cavity. The spleen was very much enlarged and was brittle. I sent a few blood films to the superintendent, Civil Veterinary Department, Lucknow, for examination, but no anthrax germ was detected.

A few days after another she-buffalo of the dairy fell ill. The animal was off her feed and was very dull in the morning. I went to see her in the evening, when she had laboured breathing, the pulse was almost imperceptible and the temperature was 98° F. The animal died at night In the morning I performed the post-mortem operation

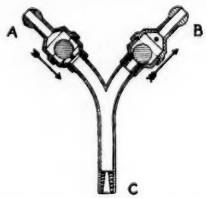
of this animal also. On cutting open the abdomen and bringing the stomach out, I noticed one hole on the wall of the rumen. The man who was helping me, attracted my attention towards a dark spot on the diaphragm. I felt the spot and at once could recognise it as the head of one nail. I cut open the diaphragm from above and below the spot. I found the nail imbedded into the heart. The pericardium was immensely thickened and contained about one pint of fluid, and was lacerated at several places. The liver was enlarged, but all other organs were normal.

Conclusion :—Probably the animal swallowed the nail with oil-cake. I found some broken packing boxes near the place where the oil-cakes were crushed. The nail was of American make and was of the same variety which was used in the packing box. In my opinion the first animal died also from swallowing a nail which punctured the rumen and the spleen.

PUMP ATTACHMENT FOR RECORD SYRINGES.

By ALFRED SAVAGE, B.S.A., D.V.M.
Macdonald College, Quebec, Canada.

THIS consists of a Y-shaped tube, A, B, C, two arms of which (A, B) are fitted with non-return valves set in opposite directions. The tubing is of nickelled brass $\frac{1}{4}$" internal diameter, the extremity (C) being tapered internally so that the attachment fits snugly on to the nozzle of a Record syringe. A more serviceable pattern is threaded at this point to screw on to a special syringe. The valves are of the ball type, accurately ground, and only permit the passage of fluid in the directions indicated by the arrows. They are covered with screw-on caps, and are completely accessible for cleaning.



The attachment is useful for administering quantities of fluid intravenously, when the rubber tubing attached to the intake arm is dropped into a bottle containing the solution.

It has also been used for the experimental transfusion of known quantities of blood direct from one animal to another, in which case the valve arms are connected with tubing and cannulæ to the jugulars of the animals concerned. When used for this purpose, the apparatus should be filled with blood by a few strokes of the syringe before

being attached to the recipient's vein, otherwise air will enter and the actual quantity transfused cannot be accurately known. In practice, using a 20 c.c. syringe, it has been found that about 2000 c.c. of blood can be passed through the apparatus before clotting begins in the valves.

Messrs. Arnold & Sons made the original to my specifications.

General Articles.

PRACTICAL METHODS OF TREATMENT FOR WORM INFESTATION.*

THIS paper will deal as briefly as possible with a dozen of the more important worm parasites affecting horses, cattle, sheep, swine, dogs, cats, and poultry. It will approve the use of perhaps a half-dozen drugs. It will deal with nematode worms primarily. In the belief of the writer, this is a practical paper. There is a disposition among practitioners to regard laboratory men as impractical. As a laboratory man, it is the writer's belief that as regards the use of anthelmintics the practitioner is frequently highly impractical in that he often uses inefficient measures in place of equally feasible effective ones. The determination of the value of anthelmintic medication in practice is not always a simple and certain procedure. Under what we may call barnyard, stable, hog-pen and kennel conditions, it is not always easy to ascertain what worms are passed. There are too many complications. The manure of one animal is mixed with that of other animals, and that of one day with that of other days. The farmer or the stable hand is commonly uncertain as to just what has happened, and neither their observation nor their judgment can be trusted in many cases. The technique of examination necessary under such circumstances is crude and unsatisfactory. Poking in the manure with a stick gives a minimum amount of information. The number of worms passed may sometimes be ascertained or guessed at, if the worms happen to be large ones, but the number left cannot be readily ascertained, and clinical evidence of recovery from a sub-chronic afebrile state of malnutrition and impoverishment, such as is commonly present in clinical cases of parasitism, comes slowly, and such evidence can seldom be sought for by the busy practitioner. Under these circumstances, drugs of but little anthelmintic value become established as anthelmintics. Strictly speaking, treatment with such drug is not practical treatment.

These are conditions practically inseparable from the practice of veterinary medicine and no criticism can be fairly levelled at the

* Abstract from a Paper presented at Section on Sanitary Science and Police, 55th Annual Meeting, A.V.M.A., Philadelphia, 1918.

practitioner on that score. What we need in this case are dependable anthelmintics, with an efficiency established by numerous tests under experimental conditions. This is the task of the laboratory man. It is a task that has been undertaken, but only a small part of the work has yet been done. Part of what I may say to-day will probably prove to be premature in the light of what we will know next year, but if we waited till we knew everything about a subject before telling it, rather than tell the little we know, our progress might be surer, but it would undoubtedly be much slower.

Critical laboratory tests of numerous reputed anthelmintics—and there are hundreds of substances that have had anthelmintic value claimed for them—show that most of the anthelmintics have less value, often much less, than is commonly assigned to them, while a few prove on critical test to have the value which clinical evidence has attributed to them. These results naturally lead to scepticism in regard to the actual value of untested anthelmintics. By a critical test I mean the administration of the drug to experiment animals under fixed conditions, the subsequent collection of all fæces passed, the careful collection of worms from such fæces daily for a period of four or more days, and, finally, the killing of the experiment animal at the end of the experiment and the post-mortem collection of all parasites not removed in order to ascertain where the treatment failed, as well as where it succeeded. Most of the recommendations I wish to make are based on such tests, and where they are not, I make my recommendations with reservations.

The horse is infested with a number of worms, of which we will consider only the strongyles, pinworms and ascarids.

The strongyles of the horse include several genera, but the two genera of importance in the large intestine are the genus *Strongylus*, sometimes called *Sclerostomum* (the large red palisade worms) and the genus *Cylicostomum*, also called *Cylichnostomum* and *Trichonema* (the small worm from the large intestine). The latter genus includes a rather large number of species which have been lumped under the name *Strongylus tetracanthus* or *Sclerostomum tetracanthum*. There are three species of *Strongylus* commonly present in horses, *Strongylus equinus*, *S. edentatus* and *S. vulgaris*. Species of both genera are commonly present in the same animal and often in large numbers. The disease due to the presence of the strongyles of both genera has been called stronglidosis by Leneveu. It is an afebrile, wasting disease,, characterised by digestive disorders, debility, anemia, and edema, and complicated by the many serious sequelæ resulting from aneurism production by *S. vulgaris*.

It is generally understood that these worms are hard to remove,

and on that point the veterinary practitioner and the parasitologist are in agreement. It is, therefore, somewhat surprising to learn that, on the contrary, these worms are not particularly difficult to remove. In tests which I made in collaboration with Dr. R. H. Wilson and Mr. Meyer Wigdor, we obtained very high anthelmintic efficacy in the treatment of strongylidosis. The results of our experiments are detailed in a paper which is already in press, but I will give a synopsis of those results here.

We secured the removal of every *Strongylus*, 107 of them, from a horse that had fasted over 24 hours, by the administration of 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed 96 per cent. of the *Strongylus* present, 66 out of 69, from a horse that had fasted for 24 hours, by the administration of 16 mils of oil of chenopodium, followed 2 hours later by a quart of linseed oil. We removed 95 per cent. of the *Strongylus* present, 78 out of 82, from a horse that had been fasted over 24 hours, by the administration of 3 6-mil doses of oil of chenopodium at hour intervals, followed an hour after the last dose by a litre of linseed oil. We removed 76 per cent. of the *Strongylus* present, 61 out of 80, from a horse that had been fasted less than 24 hours, by the administration of 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed 48 per cent. of the *Strongylus* present, 102 out of 214, from a horse that had been fasted less than 24 hours, by the administration of 2 ounces of turpentine in a quart of linseed oil. We removed less than 1 per cent. of the *Strongylus* present from one horse that received 18 mils of oil of chenopodium and a quart of linseed oil after fasting less than 24 hours; from a second horse that received 18 mils of oil of chenopodium and a quart of linseed oil after fasting less than 24 hours; from a third horse that received 8 mils of oil of chenopodium and a quart of linseed oil after fasting 24 hours; from a fourth horse that received 2 drams of tartar emetic in a mash daily for 5 days; and from a fifth horse that received 2 drams of iron sulphate in a mash daily for 7 days. The foregoing shows that 96 and 100 per cent. efficacy were secured by the use of 16 mils of oil of chenopodium, followed immediately or 2 hours later by a quart of linseed oil, in animals that had been fasted over 24 hours. In these cases, the horses were given a light feed in the evening and all hay and bedding removed. No food was given the next day. The next day the treatment was given early in the morning and the animal not fed for 3 hours afterwards. Where animals were fed the morning before the treatment, equally good results were not obtained.

With approximately the same size of dose, the efficacy fell to 76 per cent. in one case and less than 1 per cent. in another. With

smaller doses, 10 mils and 8 mils, the efficacy remained below 1 per cent. It would appear from this that doses of about 16 mils of oil of chenopodium were needed, and that the animal should be fasted over a period of almost 36 hours to ensure the best results. The one experiment with turpentine, securing in 2-ounce dose in a quart of linseed oil the removal of 48 per cent. of the *strongylus* present in a horse fasted for less than 24 hours, indicates that we have in turpentine a fairly effective substitute for oil of chenopodium when the latter is unobtainable.

Some experiments I performed previous to the experiments noted above bear out our findings in a general way. Horse No. 1 was given 8 mils of oil of chenopodium, followed immediately by a litre of linseed oil, after fasting for less than 24 hours. The treatment removed 51 per cent. of the *Strongylus* present, 19 out of 37. Horse No. 2 was given 16 mils of oil of chenopodium, followed immediately by 800 mils of linseed oil, and 100 mils of castor oil, after fasting for 24 hours. The treatment failed to remove any *Strongylus*. Fifteen days later this horse was given 20 mils of chloroform, followed in 15 minutes by 750 mils of linseed oil. The animal had been given some feed shortly before treatment. This treatment also failed to remove any *Strongylus*. The animal was killed 6 days later and found to have 3 *Strongylus* in the cecum. The explanation for the failure of treatment here probably lies in the presence of a very small number of *Strongylus*, perhaps safe in a remote part of the cecum. Horse No. 3 was given 12 mils of oil of chenopodium, followed by 800 mils of linseed oil, after fasting for 24 hours. The treatment failed to remove any *Strongylus*. Six days later the horse was given 2 doses of 20 mils each of carbon bisulphide at a 2-hour interval, followed by 800 mils of linseed oil two and a half hours later. The treatment failed to remove any *Strongylus*. Eight days later the horse was given 3 doses of carbon bisulphide, 3 drams to the dose, at hour intervals. Sixteen days later the animal was killed and found to have 12 *Strongylus* in the cecum. The failure of the treatment here may have been due to the size of the dose, the fasting period, the presence of a few *Strongylus* in a remote part of the cecum, or to the development of sexually mature forms from agamic worms attaining the intestine between the time of treatment and the time of death. Horse No. 4 was given 20 mils of carbon bisulphide, followed by 800 mils of castor oil one and a half hours later. The treatment failed to remove any *Strongylus*. Five days later the horse was given 12 mils of oil of chenopodium, followed immediately by 800 mils of linseed oil. The horse passed one *Strongylus*. Seven days later the horse was given 3 doses of carbon bisulphide, of 3 drams each, at hour intervals. No worms were passed

and the animal was killed 10 days later. There were 13 *Strongylus* post-mortem, so the treatment with chenopodium was 7 per cent. effective and those with carbon bisulphide entire failures.

So far as conclusions may be drawn from the 14 experiments noted here, and we must draw what conclusions we may, since this represents almost the entire body of dependable tests available to date, we may say that apparently *Strongylus* may be removed from horses with a rather high degree of certainty with doses of 16 to 18 mils of oil of chenopodium, followed immediately or after an interval by a quart or more of linseed oil, provided the animals have been fasted for a period of 36 hours. It would perhaps be good practice to repeat the treatment at an interval of 2 weeks.

The removal of *Cylicostomum* was even more readily accomplished in our experiments. We secured the removal of every *Cylicostomum* from 4 horses. In one of these cases the horse fasted less than 24 hours, received 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil, and passed 70 *Cylicostomum ;* in another case the horse fasted over 24 hours, received 16 mils of oil of chenopodium, followed 2 hours later by a quart of linseed oil, and passed 540 *Cylicostomum ;* in the third case the horse fasted over 24 hours, received 3 6-mil doses of oil of chenopodium at hour intervals, followed an hour after the last dose by a litre of linseed oil, and passed 1,242 *Cylicostomum ;* in the fourth case the horse fasted less than 24 hours, received 2 ounces of turpentine in a quart of linseed oil, and passed 274 *Cylicostomum.* We removed 97 per cent. of the *Cylicostomum* present (or perhaps 100 per cent., if these larval forms had issued from their cysts in the mucosa after the passage of the anthelmintic, as seems likely) 77 out of 79, or 77 out of 77, as the case may be, from a horse that had been fasted over 24 hours, by the administration of 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed 29 per cent. of the *Cylicostomum* present, 187 out of 635, from a horse that had been fed shortly before treatment, by the administration of 10 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed 11 per cent. of the *Cylicostomum* present, 428 out of 3,623, from a horse that had been fasted less than 24 hours, by the administration of 18 mils of oil of chenopodium, followed immediately by a quart of linseed oil. We removed less than 1 per cent. of the *Cylicostomum* present from 1 horse that received 8 mils of oil of chenopodium, followed immediately by a quart of linseed oil, after fasting less than 24 hours ; from a second horse that received 2 drams of tartar emetic in a mash daily for 5 days ; and from a third horse that received 2 drams of iron sulphate in a mash daily for 7 days.

From the foregoing it may be concluded that in amounts of 16 to 18 mils of oil chenopodium in 1 to 3 doses, followed immediately or at an interval by linseed oil, may be expected to remove all or nearly all strongyles from the cecum and colon of the horse in many cases, provided the animal is fasted 36 hours previous to treatment.

Infestation with *Oxyuris equi*, or pinworm, is not an uncommon condition in horses and may be suspected when horses are seen rubbing the tail against some object, or when such a practice is indicated by the presence of a bare spot where the hair has been rubbed off the tail near its root. The presence of these worms may also be suspected when yellowish egg masses are found around the anus, as a result of the crushing of the gravid female by the anal sphincter. In a recent paper, the eminent French parasitologist, Railliet (1917) states that this worm is readily removed. He notes the use of internal medication by mouth, but believes that the easy way to remove pinworms from the horse is by means of copious enemata of warm, soapy water or vinegar water, to which may be added corrosive sublimate to make a 1 : 2000 solution, or a mucilaginous emulsion of thymol, the enemata to be repeated as often as necessary. The treatments noted by Railliet as used in oral medication are as follows : Tartar emetic in doses of 15 to 20 grams in food ; corrosive sublimate in doses of a decilitre of a 1 : 1000 solution daily in drink or food for about 15 days ; areca nut, freshly ground, in 100-gram doses ; and thymol, in 15 or 20-gram doses, suspended in mucilage.

In our experience, the removal of pinworms by means of oral medication was very easily accomplished, as a rule. In the tests in collaboration with Wilson and Wigdor, we removed 100 per cent. of the pinworms present in 5 horses by the following treatments : Oil of chenopodium, 16 mils, followed immediately by a quart of linseed oil, the horse being fasted for over 24 hours ; oil of chenopodium, 16 mils, followed 2 hours later by a quart of linseed oil, the horse being fasted over 24 hours ; oil of chenopodium, 3 6-mil doses at hour intervals, followed an hour after the last dose by a litre of linseed oil, the horse being fasted for over 24 hours ; turpentine, 2 ounces, followed immediately by a quart of linseed oil, the horse being fasted less than 24 hours ; and by tartar emetic, 2 drams daily in the feed for 5 days. We failed entirely to remove the few pinworms present in 2 cases. In one of these cases the horse received 18 mils of chenopodium, followed immediately by a quart of linseed oil, the horse being fasted less than 24 hours ; in the other case the horse received 2 drams of iron sulphate daily in the feed for 7 days.

The above experiments confirm the idea expressed by Railliet as to the readiness with which pinworms may be removed. They

may be cleaned out by oil of chenopodium in 16-mil doses, followed immediately or after an interval by a quart of linseed oil, in horses that have been fasted over 24 hours, by 2 ounces of turpentine, followed immediately by a quart of linseed oil in horses that have fasted less than 24 hours, or by 2-dram doses of tartar emetic in the feed daily for 5 days. So far as we can judge from so few experiments, fasting less than 24 hours interferes with the efficacy of oil of chenopodium against these worms, and iron sulphate in 2-dram doses daily for 7 days is unsatisfactory.

The writer has been under the impression for some years that the removal of ascarids, the large maw-worms, of the horse should present no special difficulties, since ascarids in man, dogs and swine yield so readily to treatment. However, test of treatments have led to the conclusion that Neveau-Lemaire (1912) was quite right in stating that none of the numerous treatments commonly employed, such as tartar emetic, turpentine, santonica, empyreumatic oil, and benzine, give satisfactory results. We failed to remove any ascarids from 4 infested animals treated as follows : One horse received 8 mils of oil of chenopodium, another 10 mils, and a third 16 mils, the chenopodium being followed immediately by a quart of linseed oil ; the fourth horse received 2 ounces of turpentine, followed immediately by a quart of linseed oil. All these horses were fasted less than 24 hours. A horse which received 2 drams of tartar emetic in feed daily for 5 days passed 8 per cent. of its ascarids ; one that received 16 mils of oil of chenopodium, followed immediately by a quart of linseed oil, the horse being fasted over 24 hours, passed 3 per cent. of its ascarids ; one that received 18 mils of oil of chenopodium, followed immediately by a quart of linseed oil, the horse being fasted less than 24 hours, passed 12 per cent. of its ascarids ; and one that received 3 6-mil doses of oil of chenopodium, followed an hour after the last dose by a litre of linseed oil, the horse being fasted over 24 hours, passed 25 per cent. of its ascarids.

In view of the above results, the writer is unable to make recommendations in regard to treatment for ascarids in the horse. Numerous treatments are known to me, and are said to be effective. Doubtless some of these treatments are effective, at least at times, but until their value has been experimentally demonstrated I would feel no confidence in them personally, and would prefer to suspend judgment on this topic pending further investigation. Chenopodium is specifically ascaricidal in man, dogs and swine, and has a very high anthelmintic value. Its low efficacy against ascarids in the horse, in the dose used and in the way it was given, was a surprise. It is possible that a variation in dosage or mode of administration, such as giving

a larger number of fractional doses over a longer period, may secure satisfactory results. I have found such consideration necessary in securing a satisfactory chenopodium treatment for hookworm in the dog, but given such consideration a satisfactory treatment is possible. Railliet (1915) says the preference among practitioners is for tartar emetic or arsenic to remove ascarids from the horse. Tartar emetic has the disadvantage of being a severe gastro-intestinal irritant and dangerous. Experimentally, I have found treatment with repeated doses of arsenic a slow and not very certain procedure.

As far as cattle are concerned, the only parasite I care to touch on at this time is stomach worm. This is the same worm that infests sheep, and just as the stomach worm does the greatest damage to lambs among sheep, so it does its greatest damage to calves among cattle. In districts where stomach worms are plentiful in sheep, it is practically certain that they will be plentiful in cattle, and under these circumstances calves should be treated for stomach worm. Experimental tests to determine the efficacy of treatments and the doses required are lacking as far as stomach worm in cattle is concerned. However, we know that the copper sulphate treatment is highly efficacious and safe against stomach worm in sheep, and we may assume that the same treatment would be efficacious and safe against stomach worms in another ruminant in the appropriate dose, which dose can be computed reasonably well from the dose for a sheep. I prefer safe and conservative doses, repeated at long enough intervals to allow subsiding of inflammation and to avoid cumulative effects, to large doses. So I would start my dose for calves around 100 mils of 1 per cent. solution in water for animals 2 to 3 months old, grading the dose up conservatively from this point, and repeating treatment at intervals of a month or 6 weeks from spring until after frost. The dose can be given with a metal dose syringe to calves under proper restraint, or if the number warrants it, more elaborate devices for administering the dose may be used.

Stomach worm in sheep is a well-known and serious pest. There are a number of treatments which have been recommended, among which may be mentioned the gasoline treatment, the creosote treatment, and the copper sulphate treatment. In my opinion, the fact that gasoline is volatile and apt to enter the lungs, and that it must be given three times in such comparatively expensive vehicles as milk, and in large amounts, precludes its use so long as there is anything else that is free from these drawbacks. Most of the experiments on which I base my objection to gasoline and creosote have been published by Hall and Foster (1918). In the same paper will be found the

experiments showing the advantages and efficacy of the copper sulphate treatment.

The copper sulphate treatment for stomach worms in sheep was devised by Hutcheon in South Africa, and was very thoroughly tested. His reports cover the administration of the treatment to 23,000 sheep, and show the good clinical results and the freedom from worms post-mortem of sheep so treated. Our work in the Bureau of Animal Industry convinced us of the excellence of this treatment. Hall and Foster (1918) noted the use of 50-mil doses for lambs under 12 months old and 100 mils for those older, and described and figured an apparatus for administering the treatment. I am under the impression, based on our experiments and on some additional evidence obtained in Virginia and in Michigan in the control of stomach worms in sheep and goats, that stomach worms can be readily kept under control, at a point where it will have no discernible effect on the health of the sheep, and perhaps even be eradicated from the range involved, by the administration of 50 mils of 1 per cent. solution of copper sulphate every month or so except during the winter in localities where winter means freezing weather.

I have modified the apparatus originally described by Hall and Foster and now use this modification. This uses a shorter, thicker tube for the sake of compactness, is mounted on a board for the sake of convenience in hanging it up and in protecting the glass, has the inlet and outlet in glass as an integral part of the construction, partly for the sake of appearances and partly for the increased efficacy. Some earlier modifications use a glass control valve (Fig. 1), but this was too fragile, and the present apparatus, like the original, uses the clamp on the rubber tube. All apparatus is fed from a reservoir through one tube and delivers the dose to a metal tube, which is inserted in the sheep's mouth.

It is commonly stated by authorities that the copper sulphate crystals used in making this solution must be clear blue crystals, those having white patches or crusts on them to be rejected. In looking over my papers, I do not find the reason for this. I have heard some reasons assigned, among others that the white patches were oxidised or insoluble, which is not the case, as the white patches represent copper sulphate which has lost part of its water of crystallisation through efflorescence on exposure to air. Another reason which might be assigned, and this is perhaps the true reason, is that the loss of this water makes a difference in the amount of copper sulphate necessary in making up a solution, so that the weight of blue crystals, containing a rather large amount of actual $CuSO_4$ as the same weight of whitish material containing less water of crystallisation.

The fresh blue crystals of copper sulphate are $CuSO_4$, $5H_2O$; on exposure to air the light-coloured patches form and these have the formula $CuSO_4$, $2H_2O$. At 100 C., $CuSO_4$, H_2O is formed and at red heat $CuSO_4$. The differences in weight of these various forms of copper sulphate make considerable difference in the amount required to make a 1 per cent. solution or any given strength. Thus, to make a quart of the 1 per cent. solution would require 0.946 gm. of the blue crystals, 0.747 gm. of the blue-white powder formed on the crystals by efflorescence, or 0.6 gm. of the anhydrous copper sulphate formed at red heat. Hence, in making a solution, it is important to know what strength is being made, and one should use only one sort of copper sulphate to insure this. The copper sulphate solution resulting, if of the required strength, will be the same, no matter what form of the salt is used.

Nodular worm infestation in sheep is a serious disease which I mention only to express the opinion that we have not as yet established a really satisfactory treatment for it. In our experiments in the Bureau of Animal Industry, Hall and Foster found an efficacy of 17 per cent. for chloroform and castor oil, 16 per cent. for gasoline in milk, 9 per cent. for chenopodium, 0.6 per cent. for copper sulphate solution, and 0 per cent. for powdered copper sulphate in capsule, and petroleum benzine in milk. The presence of the complex ruminant stomach and the tact that the adult nodular worm is in the cecum and colon remote from the mouth are facts that make oral medication for nodular worm a difficult matter. The bulk of the injury due to the worm is done in the larval stage, so that the removal of the adult worm, if accomplished, probably does little for the sheep, unless the anthelmintic treatment is part of an eradication programme contemplating adequate prophylaxis as well. Rectal medication might be used for the removal of the adult worms, but this is a slow procedure and less apt to be practical than oral medication.

Railliet (1915) notes the use of such a method by Brumpt. A preliminary dose of 25-30 gms. of sulphate of soda is given to the sheep to render the stools fluid. This being accomplished, the sheep is suspended by its hind legs and given a rectal injection of 1-1½ litres of water containing a thymol emulsion, with the thymol at the rate of 1 gm. for each 3-5 kilos of weight of sheep; the anus is then held closed and the abdomen manipulated in such a way as to make the lavage penetrate and rinse out the intestine. This method is perhaps suitable for the patient workers of Europe with their sheep scattered in small flocks over many holdings, but it is not well adapted to the American temperament or the large flocks in this country.

The worm which is most generally recognised as a common

drawback to swine-raising is the ascarid. These worms are extremely common in swine and are often present in large numbers. They are large worms and frequently may be seen in the intestines of swine at abattoirs in such numbers as to distend the small intestine, forming a sort of sausage with worms for the stuffing. In the experiment work carried on at Washington, chenopodium was found superior to any other drug for the removal of these worms. Oil of chenopodium may be used in about this dosage : Give pigs 1 mil of the oil for every 25 pounds of weight of pig up to 8 mils, following the dose immediately by a purgative, such as an ounce of castor oil for animals weighing up to 100 pounds, and double this amount for those weighing over 100 pounds. Be sure the animal is fasted a full 24 hours before treatment and not fed for two or three hours after treatment. The writer has seen abundant evidence of the necessity for observing this rule. Restraint for pigs is a more or less vexatious problem, but Foster found that he could dose 176 hogs in an 8-hour day, the animals ranging in size from young pigs to large boars and brood sows. We dosed pigs by pulling the jaws apart with two loops of heavy wire or rope. Another method which is used is to put one end of a short piece of old rubber garden hose in the pig's mouth and pour the dose through the hose as the pig chews on it.

While on this topic of dosing pigs, the writer would like to again express the idea that mineral mixtures and stock tonics are inadequate and unsatisfactory substitutes for anthelmintic treatment. Experiments by Foster and myself in the Bureau of Animal Industry convinced us that mixtures of charcoal, lime, ashes, iron sulphate and such ingredients were of no value in removing worms or preventing worm infestation in swine, but the Bureau did not see fit to publish our conclusions. The reason which was given me for this was that these mineral mixtures were valuable in the bodily economy of the pig, and that if the farmer learned that they did not remove worms he might quit using them. This reasoning did not appeal to me at the time and does not appeal to me at this time. If a farmer wishes to feed mineral mixtures for the value of the mineral food content, he should do so, but he should not invest time or money in such mixtures for the purpose of clearing out or preventing worm infestations. If he does, he allows his pigs to remain wormy when they should be relieved from worms, and puts money into something he may not need or want.

In the same category as the mineral mixture are most of the so-called stock tonics. Of these products, the Michigan Dairy and Food Department says :

" In recent years agricultural papers have been filled with adver-

tisements of various stock tonics. * * * Wherever careful experimental trials have been made under expert and disinterested supervision * * * the outcome has invariably been that the use of condimental feeds as feeds was problematical and without material effect on production."

The products are about as ineffective in controlling worms. I fed one of the best-known stock tonics to a 10-kilo dog, giving 14 doses in 16 days, using the dose for a 500-pound hog. In that period the dog passed 17 per cent. of its ascarids and no *Dipylidium*. At the same rate it would have required 3 months to free the dog of its ascarids. Had it been given in food, as it was supposed to be, it would have been much less effective. Another well-known stock tonic was fed to a 10-kilo dog daily in the dose for a 100-pound hog. As this tonic is 95 per cent. common table salt, the dog was unable to keep it down, so after 3 days' vomiting the dose was cut in half, and given daily for 14 days. No worms were passed, and the treatment was a failure. Another tonic for hogs was given to a 14.5-kilo dog, in the dose for a 50- to 75-pound pig, giving 27 doses in 32 days, or double the number said to be necessary. This treatment was 6 per cent. effective against ascarids, and removed no *Taenia*. To be sure, a dog is not a hog, but the evidence as to anthelmintic ineffectiveness is none the less relevant.

Stock tonics must be safe for general use. Anthelmintics are not safe for general use, as a rule, if they are potent. Hence, stock tonics seldom contain the amounts of potent anthelmintics necessary to accomplish much.

The writer has been testing anthelmintics on dogs for three years and has made tests on 400 dogs. As a result of this work, certain anthelmintics for dogs have been rather firmly established as satisfactory.

The dog ascarids may be easily eliminated by the use of oil of chenopodium administered in a single dose of 0.1 mil per kilo of weight of dog. The oil may be given without enclosing it in a capsule, but this causes a lot of salivation, a very tenacious saliva when the chenopodium is accompanied by castor oil, which is the way it should be given. Hard capsules may be used for the oil, or the soft, elastic capsule. In my experimental work, I have found the soft capsule entirely satisfactory and prefer it to other forms of administering the drug. I use the dosage given by Hall (1917) when administering the soft capsules, namely, 5 minims to dogs weighing 10 pounds or less; 10 minims to dogs weighing 10 to 20 pounds; 15 minims to dogs weighing 20 to 30 pounds; not to exceed 20 minims to dogs weighing over 30 pounds; and for toy dogs, cut the dose to 2 or 3 minims. Give

an ounce of castor oil to dogs other than toys, and give toys a half ounce ; give the castor oil immediately after the chenopodium. This is important. Chenopodium is toxic, constipating and a gastro-intestinal irritant. Castor oil slows absorption and distributes it over a larger surface of the gastro-intestinal mucosa, and it promotes elimination. Dogs can be given double the minimum lethal dose of oil of chenopodium with castor oil and will survive, as Hall (1918) has already noted. If dogs show symptoms of poisoning, which is not apt to be the case when castor oil is given with the chenopodium, give more castor oil. The following are contraindications for oil of chenopodium—severe acute or chronic nephritis, organic heart trouble of certain types, marked cachexia, severe gastro-enteritis, and severe infectious diseases, especially distemper. Nephritis is extremely common in dogs, as we know from such work as that of Meyer (1911) and as our postmortem examinations constantly show. Normal kidneys are scarce, even in young dogs. Meyer notes that Siebel suggested that this condition was probably a sequel to distemper, that disease which seems always and everywhere present among dogs. The large amount of meat in a dog's diet may predispose to nephritis. Ordinarily, dogs with the customary chronic nephritis tolerate oil of chenopodium very well, but I have had one or two deaths among my dogs that I thought were due to the action of a therapeutic dose of chenopodium in causing an intensification of an already severe nephritis. Ziegler (1917) regards death from a lethal dose as due to acute nephritis ; personally, I believe death is due to a combination of nephritis, gastro-enteritis and heart depression.

Organic heart trouble in dogs is rarely recognised or even looked for, and I have seen no cases where I could attribute the death of an animal to the presence of such a condition, but the fact that chenopodium acts terminally as a heart depressant indicates the danger in this quarter.

Cachexia in dogs is apt to be an accompaniment of parasitism, but it is a condition that calls for caution in the use of an anthelmintic. I have had a number of deaths occur from the use of therapeutic doses of chenopodium and other drugs in cachectic animals. Such animals should be put on a nourishing diet before treatment, but if it is necessary to administer anthelmintics immediately, use one which is not a gastro-intestinal irritant, if possible. For this purpose santonin is to be recommended. Santonin is not a drug which gives good results in single-dose treatments. Even when in large doses, and I have used such doses as a half-grain for every pound of weight of dog, santonin cannot be depended on to remove all the worms present. The correct way to use santonin, so far as tests indicate, is to give small doses

daily for a number of days, then suspend treatment for a few days and repeat if necessary. I find experimentally that such treatment can be depended on to remove ascarids without setting up gastro-intestinal irritation. So far I have found santonin a very safe drug when given with an equal amount of calomel, and I have yet to see the first fatality from this combination. I gave one dog 61 grains of santonin and an equal amount of calomel in this way in 90 days; the animal lost some weight and lost hair around the eyes, neck, the axillæ and inguinal region and along the abdomen, but seemed in good health otherwise. Another dog was given 50½ grains in 18 days.

Gastro-enteritis is a contraindication for the use of oil of chenopodium for the reason that the oil is a gastro-intestinal irritant. It is a condition that occasionally complicates distemper.

Dogs suffering from distemper should not be given oil of chenopodium. The bacterial infection overburdens the kidneys and heart, frequently occasions gastro-enteritis, and leads in many cases to cachexia. Such animals do not tolerate anthelmintic treatment.

For the removal of whipworms from the dog, santonin is the best drug of which I am aware. It should be given, as noted by Hall (1917), in doses of a grain a day with an equal amount of calomel. I think it is safest to give it for a week, then suspend treatment for a week, then repeat as often as necessary. Some experiments along this line are given here:

Dog No. 110, a mongrel, weighing 13.6 kilos, was given a grain of santonin and an equal amount of calomel daily for a total of 6 grains in 8 days. The dog passed no worms and was found to have 2 whipworms on postmortem examination. The treatment was a failure, evidently due to not being persisted in.

Dog No. 111, a terrier, weighing 10 kilos, was given the same treatment for a total of 6 grains of santonin and of calomel in 8 days. The dog passed 29 ascarids the second day of the treatment, 2 the third, 1 the fourth, and 1 the seventh. On postmortem it had 1 ascarid and 1 whipworm. It will be noted that 1 ascarid did not come away until the seventh day, and that another was still present postmortem. Had the treatment been persisted in, it would have removed the other ascarid, probably in a day or two, and the whipworms in time.

Dog No. 108, a mongrel, weighing 9.5 kilos, was given santonin and calomel 1 grain each daily for a total of 12 grains of each in 15 days. The third day of treatment the dog passed the posterior portion of a whipworm and the fourth day the anterior portion. On postmortem the animal was free from worms.

Dog No. 71, a spaniel mongrel, weighing 12 kilos, was given 1 grain each of santonin and calomel for a total of 61 grains in 90 days. The ninth day of treatment the dog passed 1 whipworm. Postmortem the dog had 32 hookworms and 4 *Dipylidium ;* this confirms the dictum that santonin is of no value against hookworms and also indicates its lack of tæniacidal value, so far as *Dipylidium* is concerned. The dog lost a lot of hair, as already noted above, and had sores around its nose, but it was very active at all times.

Dog No. 120, a mongrel, weighing 13.5 kilos, was given 5 grains each of santonin and calomel daily for 5 days, and then the dose lessened, on account of the persistent vomiting, to 2½, 3 and 3½ grains daily for a total of 50½ grains in 18 days. On the fourth day of treatment the dog passed 14 whipworms. Postmortem the dog was free from worms. This experiment and the preceding show the tolerance of the dog for santonin, when given with calomel, and also the need for persistent treatment in order to remove whipworms.

The most serious of the intestinal parasites of dogs is the hookworm. Hall and Foster (1918) found that chloroform at the rate of 0.2 mil per kilo, mixed with an ounce or so of castor oil, had an efficacy of 57 per cent. against hookworm ; oil of chenopodium at the rate of 0.1 to 0.3 mil per kilo, followed immediately by an ounce or so of castor oil, or given with castor oil, had an efficacy of 32 per cent., and thymol and calomel, in doses of 0.298 to 1.752 gm., had an efficacy of 15 per cent. In further tests of chloroform in our laboratory at Detroit, I have been unable to obtain as high efficacy as was obtained in the work at Washington. However, I have found that healthy dogs have a considerable tolerance for chloroform, surviving doses. not only of 0.2, 0.3, and 0.4 mil per kilo, but also of 0.666 mil, 1.0 mil and 2.0 mils per kilo. I have been told by a physician that he has given chloroform in doses of a half ounce to an ounce to patients. Alessandrini only uses 3-4 grams for man. The oral administration of chloroform produces an acute yellow necrosis of the liver, and this same condition is present and responsible for death in delayed chloroform poisoning from anesthesia. The condition has been studied and described by Whipple and Sperry (1909). If the patient survives, the necrosis clears up in from 10 days to 3 weeks, leaving a practically normal liver. One of the Detroit dogs, No. 88, a collie mongrel, weighing 15 kilos, was given by stomach tube 30 mils of chloroform, a dose rate of 2 mils per kilo, in 40 mils of castor oil. Soon after dosing, the dog lay down, but was up and around in an hour and showed no symptoms. An hour and a half after dosing, the dog vomited, and then lay down for a half hour. After that the dog looked and acted

entirely normal. Twenty-one days after this treatment the dog had a litter of 7 pups, and at least one of these pups was alive and well 4 months later. Fifty-five days after the chloroform was administered this dog was put in a chloroform box with 4 other dogs. The other dogs died inside of an hour. This dog survived the same atmosphere for almost 7 hours and then appeared to be coming out of the anesthesia ; more chloroform was added and the dog presently succumbed.

Attempts to remove hookworms with single doses of oil of chenopodium did not meet with a high degree of success. The repeated administration of small doses, 2-5 minims daily for several days, gave good results, but apparently occasioned some little gastro-intestinal irritation. The method most used at present in the removal of hookworms from man, the administration of 3 doses at hour intervals, gave the best results. Some tests of this mode of treatment were as follows :

Dog No. 289, a hound, weighing 21 kilos, was given 3 doses, each dose consisting of a 10-minim soluble elastic capsule of oil of chenopodium, followed immediately by 15 mils of castor oil, at hour intervals, the last dose being followed an hour and a half later by 4 mils of chloroform in 15 mils of castor oil. The following day the dog passed 61 hookworms and 5 ascarids. The animal was killed the fourth day and found to have 10 hookworms. The treatment was therefore 86 per cent. effective against hookworms and 100 per cent. effective against ascarids.

Dog No. 301, a spaniel mongrel, weighing 15 kilos, was given the same treatment, except that no castor oil was given with each dose of chenopodium and the chloroform was given an hour after the last one in 30 mils of castor oil. The day after treatment the dog passed 33 hookworms and 1 ascarid. The third day after treatment the dog was found dead. One hookworm was found postmortem. The treatment was therefore 97 per cent. effective against hookworms and 100 per cent. effective against ascarids. This dog was in a late stage of distemper and anthelmintic treatment was contraindicated. Nursing would probably have saved the animal ; the anthelmintic hastened death.

Dog No. 300, a wolfhound mongrel, weighing 18 kilos, was given 3 doses, each dose consisting of a 5-minim soluble elastic capsule of oil of chenopodium, at hour intervals, followed an hour later by 4 mils of chloroform in 30 mils of castor oil. The next day the dog passed 3 hookworms. The animal was killed the fourth day after treatment and found to have 3 hookworms, 1 *Physaloptera*, and 15 *Dipylidium*. The treatment was therefore 50 per cent. effective against hookworms and 0 per cent. effective against *Physaloptera* and *Dipylidium*.

Dog No. 292, a hound, weighing 14.5 kilos, was given the same

treatment as Dog No. 300, except that each 5-minim capsule was accompanied by 15 mils of castor oil. The following day the dog passed 23 hookworms and the second day 7 hookworms. The animal was killed the fourth day and found to have 1 hookworm and 2 *Taenia pisiformis*. The treatment was therefore 97 per cent. effective against hookworms and 0 per cent. effective against *Taenia*.

Dog No. 293, a collie mongrel, weighing 12 kilos, was given 3 doses, each dose consisting of a 10-minim soluble elastic capsule of oil of chenopodium, at hour intervals, the last dose followed an hour later by 15 gm. Epsom salts in simple syrup. The next day the dog passed 2 hookworms and the second day 2 more hookworms. The animal was killed on the fourth day and found free from parasites. The treatment was therefore 100 per cent. effective against hookworms.

Dog No. 294, a collie, weighing 19 kilos, was given the same amount of chenopodium in the same way, but the Epsom salts were omitted and one-third of a grain of cascarin was given with the first and third doses of chenopodium. Two days later the dog passed 2 hookworms and 1 whipworm, and 4 days later passed 1 more hookworm. The animal was killed the fourth day and found to have 1 hookworm, 21 whipworms, and 6 *Taenia pisiformis*. The treatment was therefore 75 per cent. effective against hookworms, 5 per cent. effective against whipworms, and 0 per cent. effective against *Taenia*.

Dog No. 299, a mastiff mongrel, weighing 15 kilos, was given 3 doses of 19 minims of oil of chenopodium in soluble elastic capsules at hour intervals, each dose being followed by the feeding of uncooked meat, to ascertain the effect of the presence of food on the efficacy of the anthelmintic. The day following treatment the dog passed 3 hookworms and 5 ascarids. The dog was killed the fourth day and found to have 5 hookworms. The treatment was therefore 37.5 per cent. effective against hookworms and 100 per cent. effective against ascarids. The presence of food lessened the efficacy of the anthelmintic, as would be expected.

Dog No. 309, a foxhound, weighing 14 kilos, was given 3 doses of 10 minims of oil of chenopodium in soluble elastic capsules at half-hour intervals, followed a half hour after the last dose by 30 mils of castor oil. After this treatment the dog broke out of its cage and got some meat. It passed no worms and was killed the fifth day after treatment. Postmortem there were 2 hookworms and 6 whipworms. The treatment was therefore 0 per cent. effective against hookworms and whipworms.

Summarizing the foregoing, it appears that very high efficacy against hookworms in the dog may be expected from the use of oil

of chenopodium in 3 doses of 10 minims each for average-sized animals or larger ones, and of 5 minims each for smaller animals. Even the latter dose is too large for toys, and should be cut down according to the size and condition of the animal. The chenopodium seems to be quite effective whether given alone or with 15 mils of castor oil to each dose. I prefer to give the castor oil, as I believe it adds to the safety of the animal very materially. The hour interval seems to give more efficiency than the half-hour interval. Some purgative should be given not later than an hour after the last dose of chenopodium. I prefer the soluble elastic capsule to other forms of administration of the chenopodium for dogs. It is convenient and effective, so far as dozens of tests on dogs show. The addition of chloroform to a final dose of castor oil probably aids in removing additional worms.

Treatment for hookworm in dogs calls for considerable judgment. Such animals already have an irritated intestine due to hookworm petechiæ, and, if clinical cases of uncinariasis or kennel anæmia, are weak, emaciated, and anæmic. It is easy to kill such dogs by anthelmintic treatment. Hookworms are difficult to remove and call for larger doses of drugs than do ascarids. They will not respond to such drugs as santonin, which are non-irritant, and they require the use of such drugs as chenopodium, chloroform or thymol, all of which act more or less as gastro-intestinal irritants. Under these conditions, it may often be advisable to combine nursing treatment with repeated treatments by small doses of anthelmintic at intervals of 2 weeks or so, until the removal of part of the worms and the nursing put the animal in shape to endure the relatively drastic treatment necessary to clean out the infestation.

The worms which are of commonest occurrence in cats are the ascarids. These set up substantially the same chain of symptoms in cats as in dogs, except that the high-strung nervous system of the cat predisposes it to certain nervous disorders, and cats infested with worms are frequently subject to " fits." The treatment I have used and found successful for removing these worms is to give the cat a half-ounce of castor oil and then stick a pin in a 5-minim soluble elastic capsule of oil of chenopodium and squirt from 2 to 4 minims of the oil against the roof of the mouth, or against the tongue. This is safe and effective. One must use these small doses in treating cats in order to be on the safe side, as they are twice as susceptible to poisoning from chenopodium as are dogs, the minimum lethal dose per kilo being only half as large.

The common nematodes of poultry are the heterakids, including the large *Ascaridia* of the small intestine and the small *Heterakis* of the cecum. I have nothing to add here to the findings reported by

Hall and Foster (1918), who found an efficacy against *Ascaridia* of 76 per cent. for turpentine in 2-mil doses, mixed with an equal amount of olive oil and followed immediately by 8 mils of castor oil, and an efficacy of 69 per cent. for oil of chenopodium in a dose of 0.2 mil mixed with 2 mils of castor oil and preceded by 2 mils of castor oil, and an efficacy against *Heterakis* of 19 per cent. for chopped tobacco stems soaked in water and mixed with feed.

Our best anthelmintics for certain purposes are oil of chenopodium, which is perhaps the most valuable anthelmintic known, santonin, valuable where repeated doses are desired and gastro-intestinal irritation must be avoided, turpentine, which acts in some respects like a weaker oil of chenopodium, copper sulphate, valuable in the ruminants, where its emetic action is not manifested, and tobacco, which seems to be adapted to the peculiar task of removing heterakids from the ceca of poultry.

Correspondence.

THE INDIAN CIVIL VETERINARY DEPARTMENT.

To the Editor of THE VETERINARY JOURNAL.

SIR,—I beg to draw attention, through the medium of your columns, to the conditions prevailing in the Indian Civil Veterinary Department, so that they may, in some small measure, be a guide to future entrants, if any.

When a veterinary officer is recruited in England for the above Department, the pay offered at the commencement of his service, viz., Rs.500 per month, or £400 per annum, appears to compare favourably with the amount of salary which a recently qualified assistant would receive in private practice.

He learns that his pay will increase in due course to Rs.1200 per month, and he will be in receipt of this amount after twenty years' service, after which he can make no further progress.

So much he learns, but nothing is explained to him as to the relative value of this amount, and the conditions under which he will have to earn it.

After arriving in India, he soon learns that the salary, which appeared good in England, has not such a rosy hue in India; in fact, for a married man with a family, the maximum pay of Rs.1200 per month is not a living wage.

The Department was brought into being by drafting officers from the Army Veterinary Department who were in British service, and in order to induce these officers, who had seen the country and understood the conditions, to remain in the country for thirty years, it was found neccessary to grant a civil allowance in addition to their military

pay, also to improve their pension and furlough pay, so that a Colonel could receive Rs.2000 per month with a minimum of Rs.1720 per month, and any officer going home on furlough, whatever his service, would receive a minimum furlough pay of £500 per annum. They could also obtain a maximum pension of £700 per year, and a minimum, after thirty years' service, of £620 per annum.

It is well to note that these conditions were considered necessary thirty years ago to attract those conversant with the conditions of the country, but nowadays when the cost of commodities has increased 200 and in many cases 300 per cent., the maximum pay offered to civilian officers recruited in England is Rs.1200 per month after 20 year's service, with no increase up to 30 years, before which they are not entitled to retire. The retiring pension offered is £437. Cognizance must be taken of the fact that the civilian officers are doing work of the same nature as the military officers, but the civilian officers come to India not knowing the value of their pay, and totally ignorant of the poor conditions of service and bad climatic conditions.

It appears attractive from an English point of view that after eight years' service an officer is entitled to two years' furlough on half pay. On arriving in India he finds that the Department is so understaffed that it is very difficult to obtain furlough at the time it is needed, because there are no reserve officers to do the work of the one proceeding on leave.

Suppose, for instance, that an officer has been granted even six months' leave after eight years' service, under what conditions would he proceed to England? The amount of pay which he would draw would be Rs.2460, out of which he has to pay his return fare. This fare would vary a little according to the part of India in which he is stationed, but the average return fare, including second class on the boat, would not be less than Rs.1300, so that he would have Rs.1160, or about £72 to keep him in England for five months; that is, allowing a fortnight each way for the journey, as in pre-war days. Out of this amount he would have to buy many additions to his outfit, so that it is perfectly clear to everyone that the furlough pay is wholly inadequate, more especially at the present time, when the sovereign in England is worth so little.

These remarks on the furlough pay have so far only applied to the bachelor, but the lot of the married man is much more hopeless. If, after eight years' service, a married officer is granted six months' leave and takes his family to England, the whole of his pay is swallowed up in train and boat fares, so that when in England he has either to live on his capital or get into debt, from which it is practically impossible for him to emerge.

The above conditions may be contrasted with the conditions of furlough for the military officers in the Department. As stated above, the latter proceed on furlough on a minimum of £500 per annum.

Also consider the hardships of the married officer while living in India. The climate in the hot weather is so trying that he has to send his wife and family to a hill station for about six months each year, thereby incurring the expense of keeping up two establishments, as he himself cannot leave the plains except for a limited period.

The veterinary officer is usually posted to fairly large stations, where expenses are naturally greater than in small ones, so that it is impossible for a married man to save anything, with the result that after thirty years' service he retires with a pension of £437 and what remains, after paying his debts, of the amount he has compulsorily placed in the Provident Fund as his only assets, and this at a time when his family expenses, such as education fees, etc., are often at their highest. Also, his pension is not transferable to the wife on his death, so should this latter contingency occur soon after the completion of service, it is clear that the officer's family would be practically unprovided for, as during his service he cannot afford to insure for any appreciable amount.

Should an officer contract any illness sufficiently serious to warrant his being placed on the sick list, he would immediately be placed on half pay, which is not sufficient to keep him and his family, with the result that he must inevitably run into debt.

From the foregoing remarks it will be seen that it is highly advisable for a veterinary surgeon who contemplates service in the Indian Civil Veterinary Department to make full enquiries before arriving at a definite decision. He will then be fully aware of the conditions under which he will have to serve, after which he will have only himself to blame if he lapses very quickly into the discontented state which prevails very strongly throughout the Department at the present time.

EX ORIENTE LUX.

Review.

THE NEW AND ENLARGED BOOK OF THE DOG. Edited by Robert Leighton. Published by The Waverley Book Co., Ltd., 7 to 9, Old Bailey, London, E.C. Complete in four volumes; pp. 624; Profusely illustrated with a large anatomical model of a dissected dog, also with 24 coloured plates and nearly 600 photographs. Price 40s.

This splendid book is one which should be in every veterinary surgeon's library, whether his practice is a canine one or not, as the facts concerning the different breeds are by standard writers and in

every instance written in an interesting manner. Mr. Robert Leighton has had the collaboration of some forty expert contributors of international reputation, each writing upon the particular variety of dog in which his experience has made him a past master, and the combination has made the work up-to-date and particularly valuable at a time like the present, when interest in the breeding of valuable dogs is again being revived.

Every breed is treated and their points described, the sporting and the non-sporting varieties, and full details are given as to kennel management and showing the management of the bitch when pregnant as well as at time of whelping.

Puppies are comprehensively dealt with both in regard to their management from birth and their puppy ailments. In fact nothing is left out. Exhibition points, legal questions, a glossary of " doggy " terms, general hygiene, and finally a chapter on amateur treatment and first aid until the arrival of the veterinary surgeon, are all dealt with and make the book one which a professional man can read with pleasure at any time.

If not specially for his own information it ought to be on his bookshelf as a work of reference, as it is a book which numbers of his dog owning clients will be certain to buy, and one cannot afford to know less than one's clients now-a-days.

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